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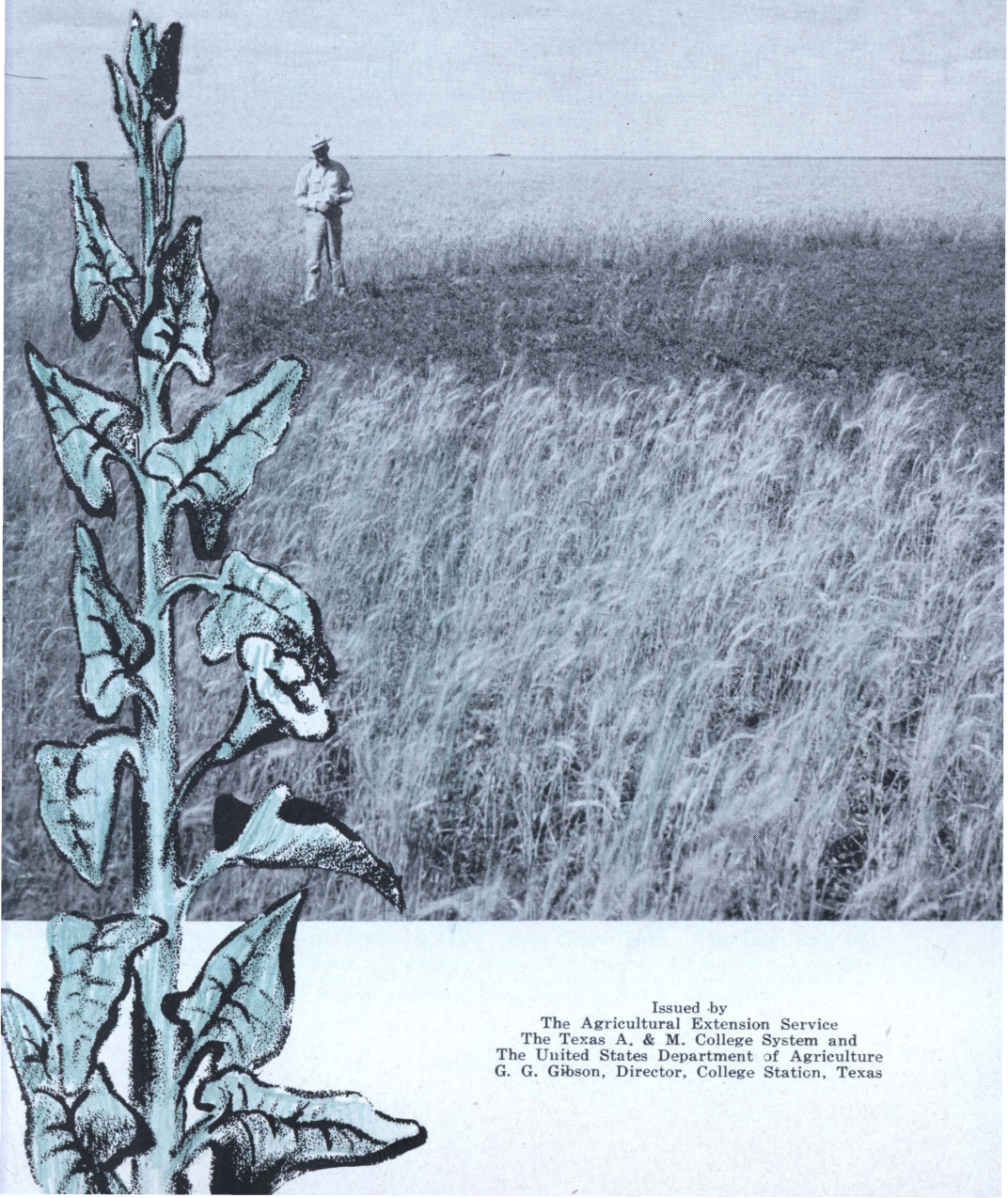
Field
BINDWEED



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Field Bindweed

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Field bindweed is a long-lived herbaceous perennial vine unusually well suited for vigorous survival and spread. It usually produces an abundance of seed throughout the summer and the seed are of great viability, surviving in the soil for long periods. The size and shape of the seed make them difficult to separate from wheat, oats, barley, sorghum, sudan, and many other agricultural seeds. The young plants are readily established and difficult to kill after they are six weeks old.

In many localities this weed is called "possession vine" because of its aggressiveness and persistence. It may take possession of the land and eventually cause abandonment if its control is neglected. It is a vigorous climber and twines itself around any weed, crop or other support present in an infested area. It grows along the ground where the stand is thin and no support is available.

The leaves are usually arrow-shaped and are fairly small. The flowers are bell-shaped, about three-fourths of an inch in diameter and predominately white, but various shades of pink may also occur. The usual blooming season in Northwest Texas is late May and early June. A crop of bindweed seed is usually mature by the time wheat is ready for harvest.

The root system of an established bindweed plant is very extensive and may penetrate the soil to great depths. The main roots are long, whitish cords about one-tenth of an inch in diameter, with many branches. The fleshy roots may form shoot buds and give rise to new plants anywhere along their length, either with or without mechanical injury.

New infestations are started from seed which in most cases is carried by harvesting machinery, livestock, or as impurities in crop seed or feed. Bindweed is also spread by the roots of the plant. New plants shoot up around the original plant and spread by this means continues throughout the life of the plant. Also new plants may be started by roots dragged from infested to un-infested areas by tillage implements.

METHODS OF CONTROL

Clean Seed and Feed

Plant crop seed that is known to be free of bindweed seed and use clean feed. Careless use of

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Bindweed in bloom.

contaminated field seed and feed will spread bindweed faster than farmers can hope to control infestations of this weed by any known method.

Pasturing Bindweed

Bindweed is relished by grazing animals. It is not a problem in permanent pastures. Large areas with thick stands of this weed can be confined and controlled by pasturing where close and sustained attention cannot be given to eradication. Permanent abandonment of these areas from harvested crops is not necessary. Pasturing may be used to minimize these infestations until more effective means of control can be started. The carrying capacity for livestock of bindweed infested areas can be greatly increased by planting them to adapted summer and winter grazing crops or to semi-permanent pasture grasses.

Intensive Cultivation

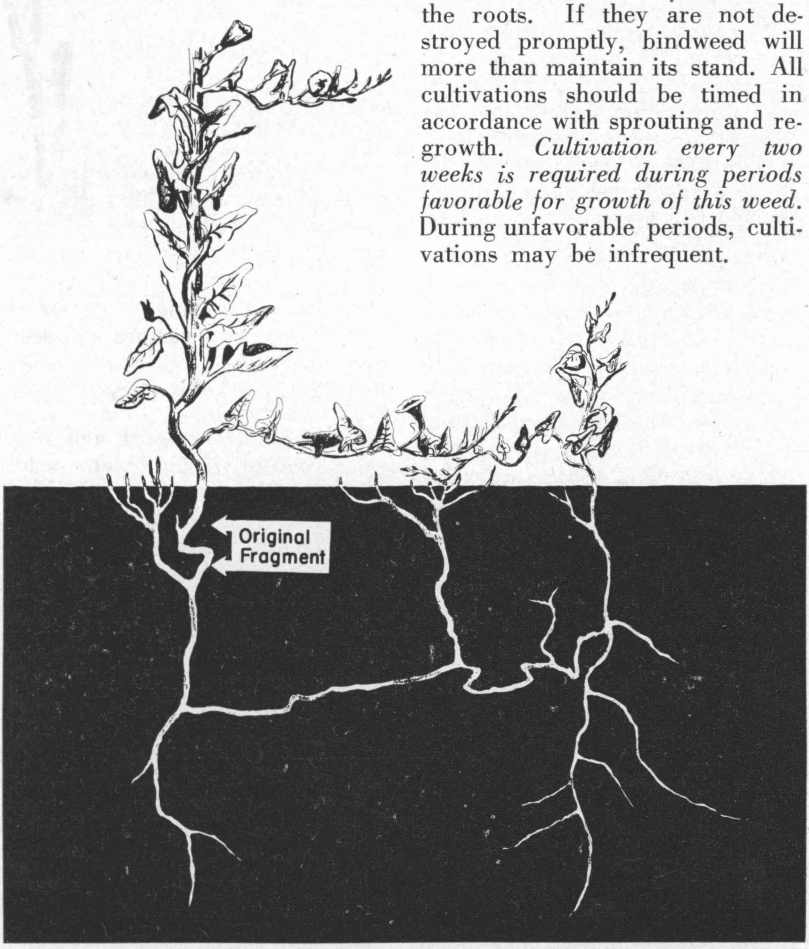
This is the quickest and most reliable method of materially reducing the stand of severe bindweed infestations on large areas. Its most effective use requires close and sustained attention over one or more years. Ordinarily during the second and subsequent years, intensive cultivation must be supplemented by more efficient clean-up practices to insure eradication of remnant infestations and subsequent grips of seedlings.

For intensive cultivation to be effective against bindweed, it must be *timely and thorough.* Seedlings must be destroyed before they are six weeks old. All the tops of established plants must be destroyed frequently enough and

over a long enough period to starve the root system.

Ordinarily by the time seedling bindweeds are six weeks old they have stored enough food in their roots to insure resprouting of any live roots left in moist or undisturbed soil. Older plants have an abundance of food stored in their roots and under favorable conditions will resprout after repeated destruction of the tops. Also the root system of an old bindweed plant is usually supported by a number of above ground shoots. If any of these escape destruction, they continue to feed the entire root system.

Up until they are approximately eight days old the leaves on new shoots from old plants use more stored food than they return to the roots. If they are not destroyed promptly, bindweed will more than maintain its stand. All cultivations should be timed in accordance with sprouting and regrowth. *Cultivation every two weeks is required during periods favorable for growth of this weed.* During unfavorable periods, cultivations may be infrequent.



Root system and growing habits of field bindweed.

Intensive cultivation must be continued throughout at least one or more bindweed growing seasons if a high percentage of the old bindweed plants are to be starved out. The growing seasons of bindweed and most harvested crops seriously overlap and prevent the planting of such crops if maximum effectiveness of intensive cultivation in eradicating bindweed is to be obtained.

Wind and water erosion may be a serious hazard during long periods of clean cultivation of large areas. For this reason it is desirable to start the cultivation period with a heavy stubble on the land and to use cultural methods that will preserve this surface litter as long as practical.

Over 98 per cent of a thick stand of old bindweeds in Potter County was killed by 16 cultivations to a depth of approximately 5 inches within one year following the 1949 wheat harvest. The area was cultivated every two weeks during periods favorable for growth. A gang of 24-inch sweeps equipped with rolling coulters and set to overlap approximately 5 inches was used. The coulters were used to permit starting the cultivation in a heavy wheat stubble and to prevent dragging of bindweed roots from one location to another. The sweeps were kept sharp at all times. They were over-lapped to insure cutting off all of the plants.

Shorter, but less effective, periods of intensive cultivation which permit the annual production of cool season crops can be used to advantage in eradication of bindweed. Temporary grazing crops might be expected to furnish several months of high carrying capacity pasture without seriously interfering with the effectiveness of late spring and summer cultivations to destroy bindweed. Intensive cultivation between the annual production of winter crops for harvest eventually would have considerable effect in reducing the stand of bindweed and is particularly effective in killing seedlings.

HERBICIDES

2,4-D (2,4-Dichlorophenoxyacetic Acid)

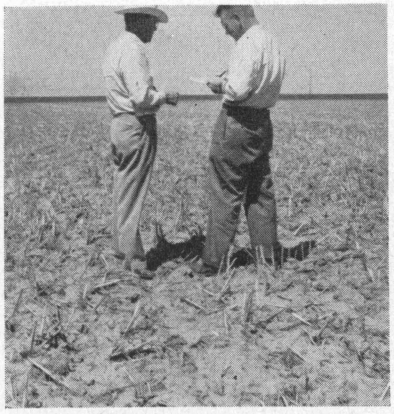
Use of this chemical to control or eradicate susceptible weeds is applicable to infestations of any size. 2,4-D is cheap and easy to apply. Favorable growing conditions for the susceptible weed and freedom from injury of valuable plants are prerequisites to satisfactory use of this or any other hormone-type weed killer. Most broadleafed field crops, such as cotton and alfalfa and many vegetables, flowers, ornamental shrubs and trees are easily damaged by the careless use of 2,4-D. Safe use of this chemical is discussed in Farmers Bulletin No. 2005 and Texas Extension Farm and Home Hint No. 383.

2,4-D is usually available as esters, amine salts and as sodium salt. The esters and amines are liquids and the sodium salt is a powder. Rates of application of 2,4-D are stated in terms of pounds of acid equivalent to avoid confusion. One form of 2,4-D is usually as effective as another when equivalent amounts are used on vigorously growing bindweed.

However, the esters are preferred under unfavorable growing conditions and on annual weeds.

All stages of vigorously growing bindweed are sensitive to 2,4-D, but best results are usually obtained when the weed is sprayed in the bud or bloom stage. Under favorable weather conditions good results are also obtained from spraying fall growth. Repeated applications of 2,4-D give good bindweed control, but seldom give complete eradication of established stands. After bindweed is sprayed with 2,4-D the top growth should not be destroyed for two to four weeks. This lapse of time is needed for the chemical to be translocated to the roots. Rates of 2,4-D that kill the tops too rapidly for the chemical to be adequately translocated should be avoided.

One pound of 2,4-D per acre usually gives better results than lower rates and as good as higher. Water is a satisfactory carrier for 2,4-D when ground spray equipment is used to treat bindweed. Oils and oil-water emulsions offer no advantages.



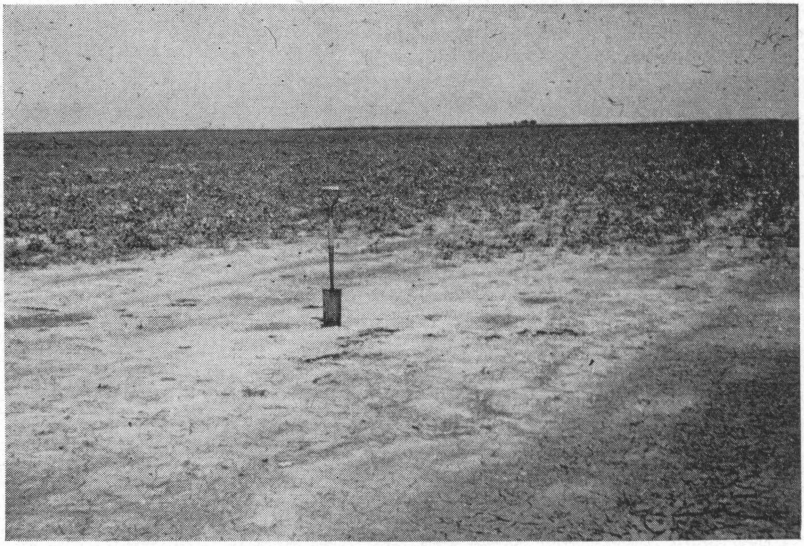
2,4-D was sprayed on this field in 1945, 1946 and 1947. In 1949 it was planted to Atlas Sorgo and sprayed. The same practices were followed in 1949 and 1950. In June, 1951, no bindweed was showing.

2,4-D may be used either alone or to supplement other practices. It can be used with the grazing of temporary or semi-permanent grass pastures to prevent bindweed seed production or to reduce bindweed stands more rapidly than can be done by grazing alone. The lowest rate of 2,4-D that is effective against bindweed should be used for this purpose to avoid possible injury to the grazing crops.

It can be used to reduce stands of established bindweed on uncropped land either alone or in combination with intensive cultivation. However, it is only a mediocre substitute for intensive cultivation.

One pound of 2,4-D acid per acre of the isopropyl ester applied during August and October 1949 and June 1950, respectively, reduced the stand of old bindweed on uncropped land near Bushland, Texas, 80 per cent by the fall of 1951. 2,4-D applied to established bindweed prior to starting intensive cultivation on uncropped land has not materially reduced the number of cultivations required for eradication. However, as a clean-up practice following one or more years of intensive cultivation, 2,4-D is valuable in killing remnant stands of old plants and successive crops of bindweed seedlings.

Cultivation can be used to bring fresh supplies of bindweed seed to the surface where they will



Bindweed infested area in Gray County, treated with five pounds of sodium chlorate per square rod in August, 1949. This picture was made in August, 1950.

germinate under favorable weather conditions. The resulting seedlings may then be killed either by 2,4-D or subsequent cultivation.

2,4-D can be used to control bindweed in resistant crops until more effective means of eradicating this weed can be employed. The crop and its stage of growth determine, however, the timing and maximum rate that can be used. Ordinarily fall-planted small grains should not be sprayed with 2,4-D until after they are tillered and spraying should be discontinued before the grain is in boot. At their most resistant stages, small grain will tolerate up to 2/3 of a pound of 2,4-D as amine or sodium salt, but only 1/3 of a pound as of an ester. If heavy bindweed seed production in standing grain is anticipated, the use of 2,4-D to prevent maturity of weed seed is often justified, even though some reduction in crop yield from 2,4-D injury is expected.

By delaying fall planting of small grain from two to three weeks, a late summer or early fall spraying with 2,4-D can be used to help control this weed. Fall application of 2,4-D followed by spring planted sorghum in close drills have usually resulted in reduction of bindweed stands. Also, pre-planting applications of 2,4-D in the spring in preparation for late drilled sorghum usually has considerable value for seasonal control of bindweeds. Sorghum and most other annual grass crops ordinarily will not tolerate rates of 2,4-D high enough to materially reduce the stand of old bindweeds growing in these crops.

Chlorate and Boron-type Chemicals

Extensive use can be made of some of the long-lasting chemicals to control small patches of bindweed up to one-half acre in size. A great deal of current use is being made of sodium chlorate, Atlacide and Borascu for this purpose. More recently, Concentrated Borascu, Polybor and Polybor-Chlorate have been introduced in various parts of the State. Tests indicate that 5 pounds of Sodium Chlorate, 7 pounds of Atlacide, 30 pounds of Borascu, and 16 pounds of Concentrated Borascu per square rod, respectively, are about equally effective in reducing established stands of bindweed. All have given very good results, but usually do not kill more than ninty-five per cent of the plants. Application of these chemicals should extend 10 or more feet beyond the apparent bindweed infested area to insure complete coverage and to prevent further spread of this weed by lateral roots. Also the soil in the treated area should not be disturbed for one or more years. For most of these chemicals, limited retreatment to kill surviving plants and to control bindweed and other seedlings is required since seed in the soil are not affected.

These chemicals act through the soil and the rapidity of their effectiveness is dependent on rainfall after they are applied. Also all of these chemicals make the soil unfavorable for most plant growth for varying lengths of time. Use of most of these materials is too recent to indicate the duration of their effectiveness on the soil. Further information concerning the use of these materials is given in Texas Agricultural Experiment Station Progress Report No. 1304.

Borascu was applied here in 1949. This picture, made in June, 1951, shows thorough control of bindweed.

Carbon Bisulfide (high-life)

Carbon bisulfide has proved satisfactory in controlling bindweed. The principal objection to the use of this material is the high cost.

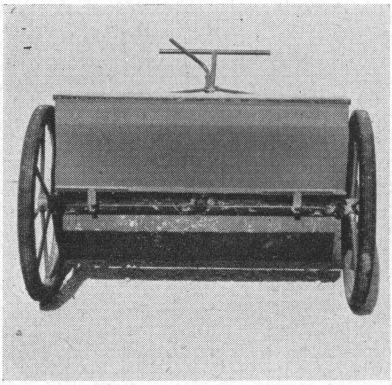
Method of Application

In solid patches, two ounce shots of the carbon bisulfide are placed 6 inches under the surface and 18 inches apart. A special applicator is required to do a good job. Farmers who do not want to go to this expense can obtain equally good results by making a crowbar-like punch that will make a 6-inch hole and pouring 2 ounces of chemical in the hole. A 3-foot piece of pipe with a funnel soldered on the end may be used. In either case, the hole must be closed with the heel or tamped to prevent the escape of the gas.

For best results on solid patches, use a string or rope with knots every 18 inches to show where the shot should be made. When one row is completed, the string is moved over 18 inches and started in such a way that the second line of shots will be opposite the blank spaces in the first line. In other words, the shots are "dodged" or "staggered."

With scattered vines, 2-ounce shots are given each individual plant. If two vines are growing within a foot of each other, one shot may be placed between the two plants.

IMPORTANT: CARBON BISULFIDE VAPORIZES. THE GAS, BEING HEAVIER THAN AIR, GOES DOWN SO THAT IN SOME CASES THE TOP FEW INCHES OF THE BINDWEED PLANTS ARE NOT KILLED. THESE MUST BE CUT OFF OR PLOWED UP AT THE END OF FOUR WEEKS OR THEY MAY START NEW GROWTH AND BECOME ESTABLISHED AGAIN.



Mechanical spreader used for applying sodium chlorate and boron compounds to small patches of field bindweed.

Methyl Bromide

Methyl bromide, a gas, may be used under a gas proof cover to control bindweed. The use of methyl bromide will be limited to relatively small areas of infestation.

C M U

Approximately 80 pounds per acre of C M U (3-p-chlorophenyl-1, 1-dimethylurea) has effectively controlled small areas in preliminary trial. *Subsequent tests will be needed to determine how long this material remains effective in the soil.* The period of soil sterility caused by this material may be excessively long.

Amount of 2,4-D Commercial Solutions Required to Make Spray Solutions of Various Strengths

Lbs. 2,4-D acid per gallon as shown on label of container	Lbs. of 2,4-D acid per pint of commercial solution	Ounces of 2,4-D commercial solution to give rates per acre as shown:			For hand sprayers: Thoroughly wet foliage of bindweed. To one gallon of water add:
		¼ lb./a	½ lb./a	1 lb./a	
2.00	.25	16 oz.	32 oz.	64 oz.	2¼ teaspoons
2.64	.33	12 oz.	24 oz.	48 oz.	2 teaspoons
3.00	.375	11 oz.	22 oz.	44 oz.	1½ teaspoons
3.34	.42	10 oz.	19 oz.	40 oz.	1½ teaspoons
3.50	.44	9 oz.	18 oz.	36 oz.	1 teaspoon
4.00	.50	8 oz.	16 oz.	32 oz.	¾ teaspoon
6.00	.75	5 oz.	11 oz.	21 oz.	½ teaspoon

NOTE: Remember—16 oz. equals 1 pint and 32 oz. equals 1 quart. Be sure to have a measure that will accurately measure quarts and pints and one that will measure ounces—you will need both.

Recommended Weight of Dry Chemicals to Control Bindweed

	Lbs. per 100 sq. ft.	Lbs. per sq. rod
Chlorate	2	5
Atlacide	2½	7
Borascu	11	30
Concentrated Borascu	6	16

To get best results from the use of dry chemicals, the soil should be moist.

CALIBRATING A GROUND SPRAYER

1. Fill supply tank with water.
2. Drive 80 rod (one-fourth mile) at speed to be used in the field, with sprayer operating at pressure (usually 35 to 40 pounds) expected to use in field.
3. Refill supply tank measuring gallons of water used.
4. Make the following calculations:

$$\frac{\text{Gallons used X 33}}{\text{Length of boom in feet}} = \text{gallons per acre}$$

5. Add sufficient 2,4-D to the gallons of water applied per acre to obtain the desired rate of 2,4-D acid per acre. For example, if it is found that 8 gallons of water are applied on each acre and one pound of 2,4-D acid per acre is desired, 1 quart of a 4-pound 2,4-D acid solution must be added for each 8 gallons of water in the supply tank.
6. Make repeated checks of amount of spray solution used so that adjustments in pressure and speed used can be made if needed.

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